

Optimizing the Learning Environment



Adams 12 Five Star Schools

"Together - educating the whole child..."

Planning & Design for High Performance Schools



David Besel, AIA/PE
Facilities Planning & Design Manager

Schools are designed for Kids



**The design of schools should
be a **physical** response to
human needs!**

Kids learn by ...

**seeing, hearing, touching, smelling
and tasting.**



Adams 12 Five Star Schools

"Together - educating the whole child..."

Planning & Design Process

The design of each new school should bring us one step closer to a truly “high performance school”.



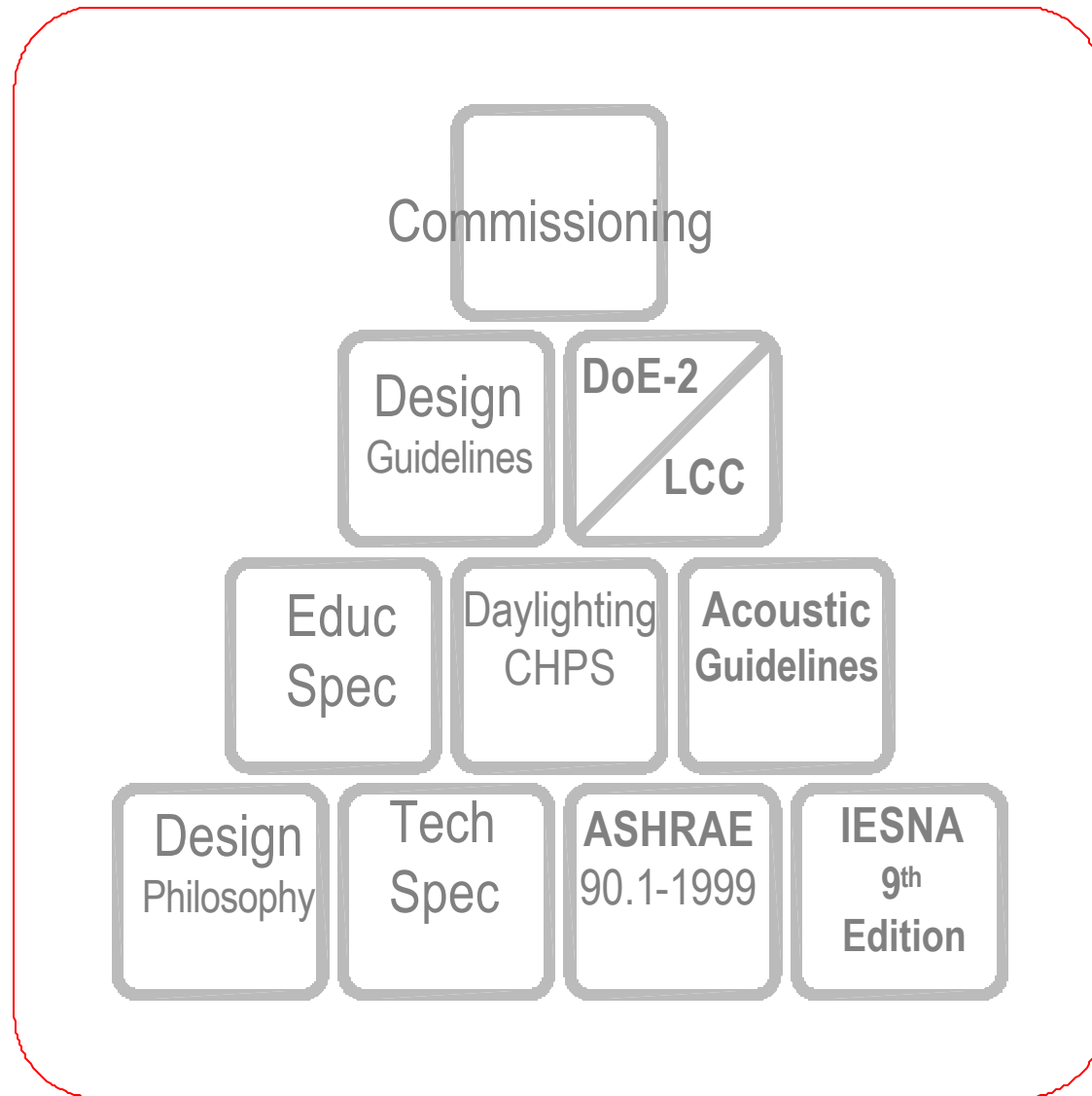
Design
Philosophy



Adams 12 Five Star Schools

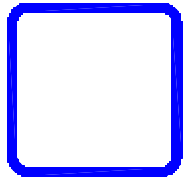
"Together - educating the whole child..."

Planning & Design Process



Adams 12 Five Star Schools

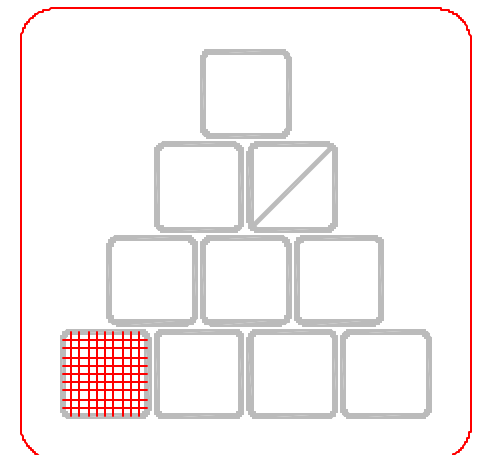
"Together - educating the whole child..."



Design Philosophy

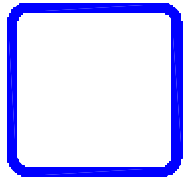
District facilities should...

- ✍ out-live the tenure of faculty and staff.**
- ✍ accommodate various instructional plans, learning styles, and changing technology.**
- ✍ maximize flexibility for future use.**
- ✍ accommodate joint-use of facilities.**
- ✍ comply with educational specifications to provide district-wide equity.**
- ✍ be designed, constructed, operated and maintained to have a useful life of 50 years, or more.**



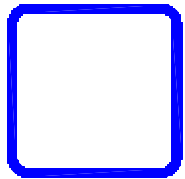
Adams 12 Five Star Schools

"Together - educating the whole child..."



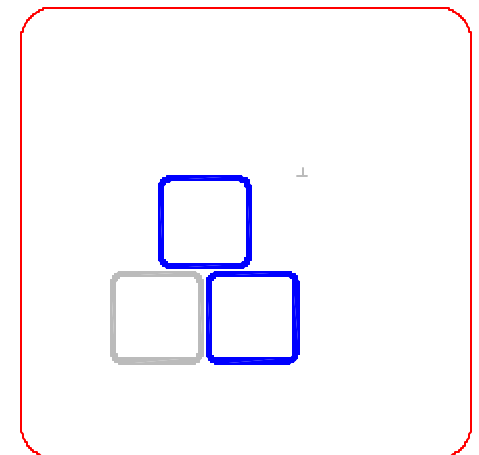
Educational Specifications

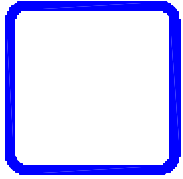
-  **Roadmap for the design of new schools**
-  **Yardstick to measure existing schools**
-  **Template defining building standards to establish equity district-wide**



Technical Specifications

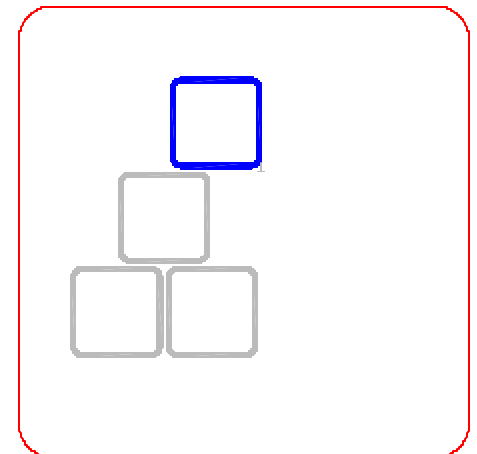
-  **Define uniform and consistent quality standards**
-  **Assure district-wide compatibility**
-  **Minimize inventory**
-  **Maximize durability and maintainability**





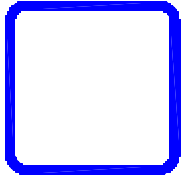
High Performance Design Guidelines

- ✍ Comply with Acoustical Guidelines in all instructional spaces, as modified by the District.**
- ✍ Daylighting should be the primary source of light in at least 75% of all instructional spaces.**
- ✍ Limit energy consumption to 1.0 watts/SF electric lighting only - Integrate electric lighting + daylighting to reduce to 0.5 watts/SF.**
- ✍ Limit average annual energy consumption to 60,000 Btu/SF/Yr.**
- ✍ Utilize computer modeling and Life Cycle Cost Analysis to estimate building performance.**



Adams 12 Five Star Schools

"Together - educating the whole child..."



Acoustics

- Young children,
- Children with hearing loss, (up to 20% of the school population)
- Children learning a second language, and
- Children listening in reverberant rooms...

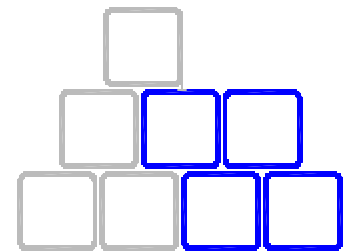
require a higher signal-to-noise ratio in order to understand the **spoken message**. --Acoustical Society of America

Comply with ANSI/ASA S12.60-2002 Classroom Acoustics – as amended by the District

__ dBA + 15 dBA = __ dBA < 70 dBA

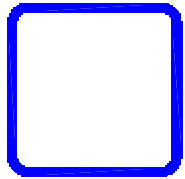
If the normal speaking voice = 50 to 55 dBA

then, the noise level < 35 to 40 dBA



Adams 12 Five Star Schools

"Together - educating the whole child..."



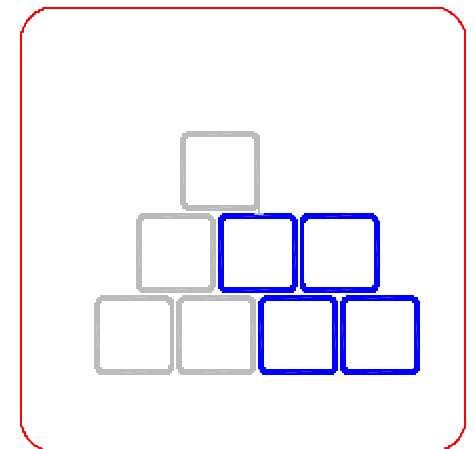
Daylighting

“We found that students with the **most daylighting** in their classrooms progressed 20% faster on math tests and 26% on reading tests in one year than those with the least.”

--Heschong Mahone Group, submitted to Pacific Gas and Electric

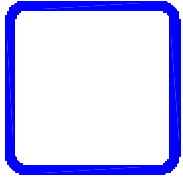
Daylighting should be the primary source of light in at least 75% of all instructional spaces.

- Orient the building to maximize daylighting options
- Provide uniform distribution with minimum glare
- Minimize direct-beam sunlight penetration and control its impact
- Size glazing to optimize daylighting
- Reference Guidelines for Daylighting – CHPS Best Practices Manual - 2002



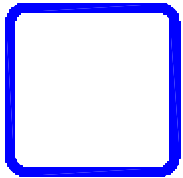
Adams 12 Five Star Schools

"Together - educating the whole child..."



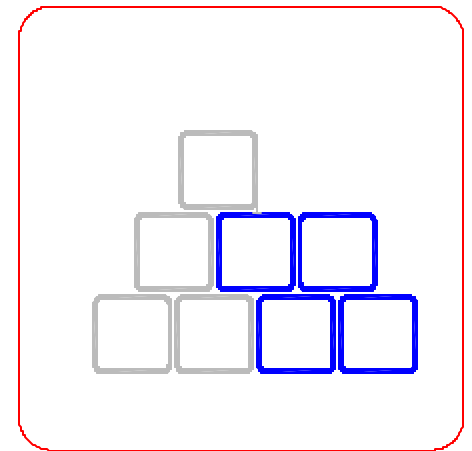
HVAC Design Criteria

- Based on ASHRAE/IES Standard 90.1-1999
- Provide the option for cooling with outdoor air (economizer cycle)
- Systems and equipment should be “right-sized” without additional “safety factors”, based on the District’s specified design criteria



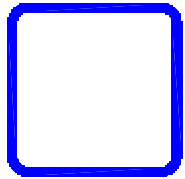
Lighting Design Criteria

- In addition to the IESNA Lighting Handbook, comply with ASHRAE/IES Standard 90.1-1999
- Limit energy consumption to 1.0 watts/SF with electric lighting only
- Integrate electric lighting + daylighting to reduce to 0.5 watts/SF.



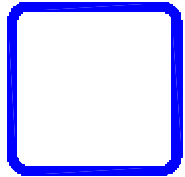
Adams 12 Five Star Schools

"Together - educating the whole child..."



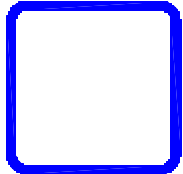
Life Cycle Cost Analysis

- Design for effective and efficient operation and maintenance
- Optimize the use of natural resources
- Specify energy efficient materials, systems, and equipment
- Make decisions based on Life Cycle Cost analysis



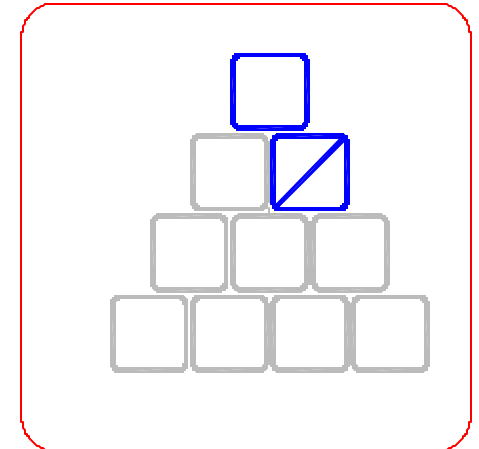
Estimated Building Performance

- Utilize modeling software including DoE-2 during schematic design, design development, and construction document review



Commissioning

- Building systems and components should comply with construction documents, and operate the way they were designed.



High Performance Design

A high performance school is...

- ✍ healthy**
- ✍ thermally, visually, and acoustically comfortable**
- ✍ energy efficient ...**
- ✍ easy to maintain and operate**
- ✍ commissioned ...**



The Collaborative for High
Performance Schools,

**Best Practices Manual – 2002
Edition**

Projects:

The design of each new school should bring us one step closer to a truly “high performance school”.



Adams 12 Five Star Schools

"Together - educating the whole child..."

Projects:

Middle School #9 - Shadow Ridge



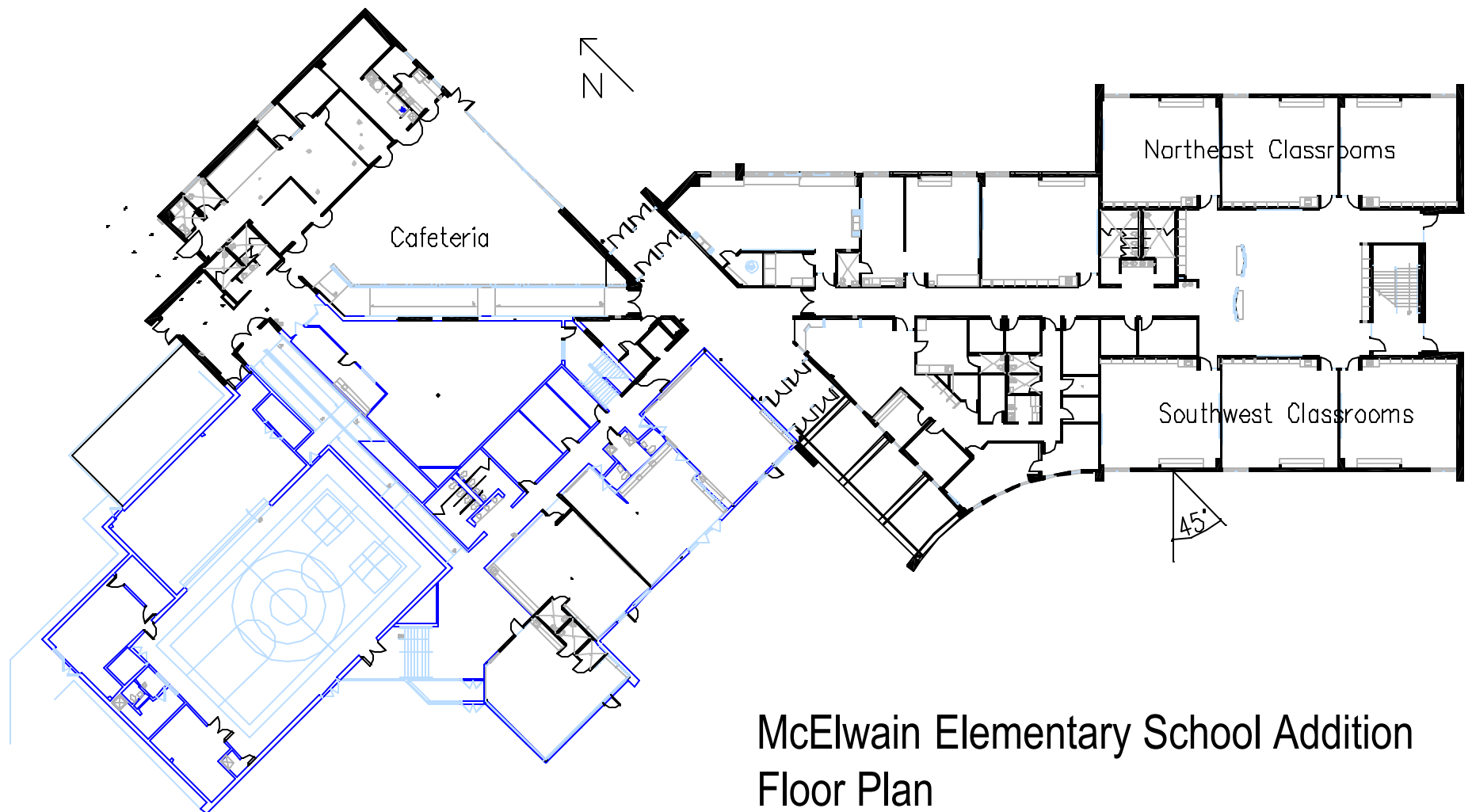


Prairie Hills
Elementary
School



Adams 12 Five Star Schools

"Together - educating the whole child..."



McElwain Elementary School Addition
Floor Plan



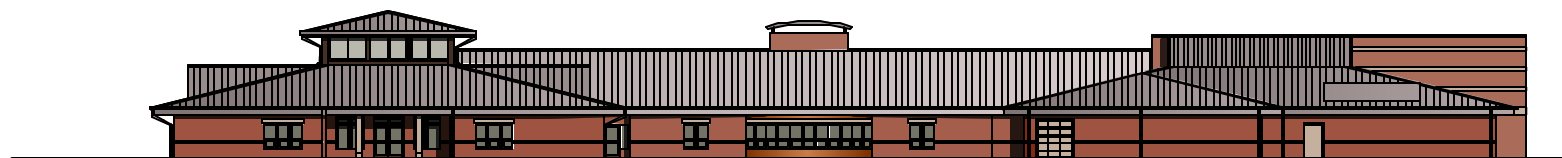
Computer modeling of classroom daylighting
McElwain Elementary School



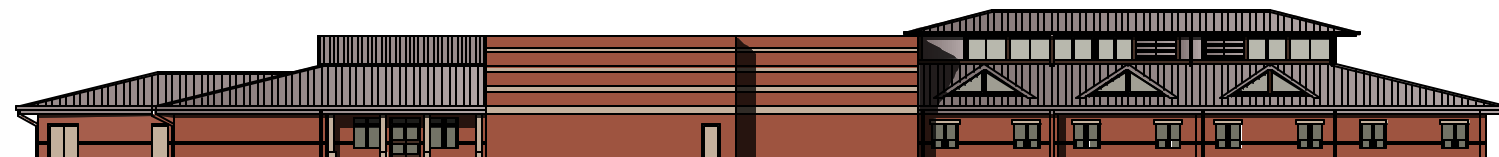
EAST ELEVATION



NORTH ELEVATION



WEST ELEVATION



SOUTH ELEVATION

Elementary School #30
Adams 12 Five Star Schools
Elevations

Christiansen, Reece & Partners, PC



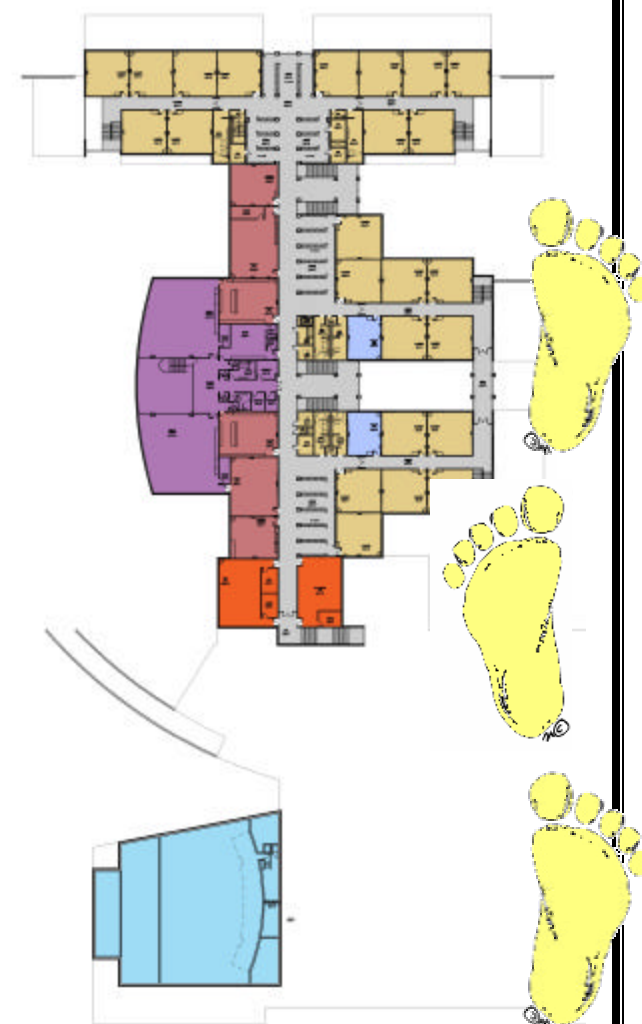


Computer modeling of classroom daylighting
Elementary School #30 - Prototype



Adams 12 Five Star Schools

"Together - educating the whole child..."



Upper Level Floor Plan
Scale - 1" = 32'-0"



Adams 12 Five Star Schools

"Together - educating the whole child..."

Average Annual Energy Use

School Type	District Average	Constructed 1990-99	New Schools (projected)
	Kbtuh/SF/Yr		
Elementary	88	100	53
Middle	89	74	65
High	74	81	tbd
All schools	84	85	

David Besel, AIA/PE

Facilities Planning & Design Manager



Adams 12 Five Star Schools

"Together - educating the whole child..."